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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,613	11/25/2003	Razvan Iordache	14XZ129307	5611

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EXAMINER

SMITH, JEFFREY S

ART UNIT	PAPER NUMBER
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2624

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09/13/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/721,613

Applicant(s)

IORDACHE ET AL.

Examiner

Jeffrey S. Smith

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 and 23-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21, 23-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION*****Requirement for Information***

Applicants and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application. The information is required to complete the disclosure's description of what is known in the art.

Paragraph 12 of the application states that "In a known way, this histogram 6 comprises a bordering part 8, representing the edge of the breast at its end and, typically, two peaks corresponding to an adipose zone ZA and a glandular zone ZG."

In light of this sentence, please state whether applicants and the assignee of this application are aware of work performed or information available to the public before November 27 2002 that describes, includes or discloses defining an adipose region or a glandular region in an image based upon a threshold determined from a histogram of the image.

This information is relevant to patentability. Applicant is reminded that failure to fully reply to this requirement for information will result in a holding of abandonment. This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent Application EP 1 113 192 by Nicolas et al. ("Nicolas") in view of U.S. Patent No. 5,550,888 issued to Neitzel et al. ("Neitzel"), WO 01/69532 by Langan et al. ("Langan"), and U.S. Patent Number 5,768,406 issued to Abdel-Mottaleb ("Abdel-Mottaleb").

For claim 1, Nicolas discloses acquiring an image of an object with a radiology apparatus and computing a radiological thicknesses (see element 15 of Figure 4), filtering the image of radiological thicknesses (16), subtracting the context image to obtain an image of the details (18), processing the context image (17), and adding together the image with reduced dynamic range and the image of enhanced details (19).

Nicolas does not disclose processing the context image by means of a second table computed from the image of the radiological thicknesses to obtain an image of coefficients which will then weight the image of the details to obtain an image of enhanced details.

Neitzel discloses processing the context image (Lo) by means of a second table (LUT2, element 34) computed from the image of the radiological

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thicknesses to obtain an image of coefficients (G) which will then weight the image of the details (mult. 35) to obtain an image of enhanced details (Ht) (see figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of compensation of thickness of an organ disclosed by Nicolas to include the method of enhancing the detail image disclosed by Neitzel for the advantage that the transformation functions are no longer formed by a more or less complex calculation from the density function and the contrast function entered by the user, because in this case these functions already represent the transformation functions, as taught by Neitzel at column 10 lines 20-24.

Langan discloses compressing the dynamic range of the image so that it is contained within the dynamic range of the imaging device, this small dynamic range of the imaging device being smaller than the wide dynamic range of the acquired image, thereby permitting an acquired image originally having a wide dynamic range to be displayed with heightened contrast on an imaging device having a smaller dynamic range as disclosed on page 6 lines 8-24.

It would have been obvious to one of ordinary skill in the art at the time of invention to compress the dynamic range of the image with reduced dynamic range and heightened contrast of Nicolas and Neitzel for the benefit of displaying the image on an available display device having a dynamic range of 256 levels as taught by Langan on page 6.

Abdel-Mottaleb discloses determining a threshold based upon a histogram of the object in the image of the radiological thicknesses (abstract, "at least 20 threshold levels are determined from a histogram of the image") and defining segmented regions of the object based upon the threshold wherein said segmented regions are less than the whole object (the threshold levels "discriminate (or segment) spots.... A processed mammogram having the suspect masses marked or enhanced (i.e., segmented) is produced and displayed").

It would have been obvious to one of ordinary skill in the art at the time of invention to segment the image of Langan, Nicolas and Neitzel using the threshold levels of Abdel-Mottaleb for the benefit of identifying suspect masses as taught by Abdel-Mottaleb in the abstract.

For claim 2, Neitzel discloses weighting the image of the details by an image of coefficients to obtain the image of enhanced details as shown in Figure 5.

For claims 3, 4 Nicolas discloses building the context image from the image of radiological thicknesses by a medial filtering as shown in Figure 4.

For claims 5-7, Nicolas discloses the function applied to each pixel of the context image to obtain the image with reduced dynamic range is positive, linear by pieces, and non-decreasing (see column 6 lines 9-24).

For claims 8-11, this element corresponds to paragraphs 11, 17, 26-27, and graphs 1 and 3 of Figure 1 of the disclosure. This element is allowing a user to set the dynamic range by adjusting the maximum contrast, or "dynamic

window WW (which controls the maximum differential gain)” and the contrast density, or “its center WC (the level of maximum differential gain).” Neitzel discloses that the compression of the dynamic range is obtained by a positive and non-decreasing function, characterized by two parameters adjustable by the user, the parameter, which controls the maximum differential gain, and the parameter that defines the maximum differential gain level in the starting dynamic range (see the abstract the user can preset the contrast and the density of the visible image in conformity with his requirements and independently from one another). Nicolas in the abstract and paragraph 35 also discloses this.

For claims 12-15, Neitzel discloses that the operations of processing the images of context and the images of the details are modified as a function of the value that controls the maximum differential gain selected by the user (the user can select the maximum contrast). Nicolas also allows a user to select the maximum contrast.

Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nicolas Neitzel Langan and Abdel-Mottaleb as applied to claim 1 above, and further in view of J. Kaufhold et al. “A Calibration Approach to Glandular Tissue Composition Estimation in Digital Mammograph,” (“Kaufhold”).

For claims 16-21, Nicolas discloses that the computations of the two functions used to modify the images of context and of the details are predefined as functions of proportion of object structure (see figure 2), and Kaufhold

discloses that the method is adapted by a calibration procedure to each radiological thickness image (abstract).

It would have been obvious to one of ordinary skill in the art at the time of invention to calibrate the method of Nicolas Neitzel Langan and Abdel-Mottaleb with the calibration method of Kaufhold for the benefit of replacing analysis with straightforward measurements as taught by Kaufhold on page 1869 lines 2-3.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nicolas, Neitzel Langan and Abdel-Mottaleb as applied to claim 1 above, and further in view of common knowledge in the art as shown by Gonzalez et al., "Digital Image Processing," Prentice-Hall, Inc., page 85.

For claim 23, which corresponds to the step function of table 4 in figure 1, Nicolas discloses defined regions of the object, and Neitzel discloses computing coefficients which, in each pixel, multiply the detail image of enhanced details, by applying a positive function to each pixel of the context image (see for example column 1 lines 60-67. See also the positive functions in figures 2a-2e).

Although Neitzel does not explicitly disclose a constant function, this function is well known in the art. For example, Figure 3.10(a) on page 85 of "Digital Image Processing" shows a positive function, the slope of which is constant by pieces and is multiplied with each pixel based upon whether the pixel is above or below the threshold  $(r_1, s_1)$ . It would have been obvious to one of ordinary skill in the art at the time of invention to include the piecewise linear constant multiplication coefficients that are well known in the art with the defined



regions based upon a threshold of Nicolas, Neitzel and Langan, because the principal advantage of piecewise linear functions is that the form of the piecewise functions can be arbitrarily complex as taught by "Digital Image Processing."

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nicolas, Neitzel Langan Abdel-Mottaleb and Gonzalez as applied to claim 23 above, and further in view of European Patent Number 1004985 by Lienard et al. ("Lienard").

Lienard discloses a histogram (figure 8) that can be used to determine threshold levels for defining adipose and fibro-glandular regions (paragraphs 20, 21, 32-34 and 36).

It would have been obvious to one of skill in the art at the time of invention to use the thresholds from the histogram of Lienard to segment adipose and fibro-glandular regions using the thresholding method of Abdel-Mottaleb for the benefit of making the radiologist's work less complicated as taught by Lienard in paragraph 23.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nicolas, Neitzel Langan Abdel-Mottaleb Gonzalez and Lienard as applied to claim 24 above, and further in view of Kaufhold.

Gonzalez discloses choosing a function for coefficients that is constant by pieces, and Kaufhold discloses using different coefficients of expansion for said adipose and fiber-glandular regions as shown in figure 4.

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It would have been obvious to one of ordinary skill in the art at the time of invention to using different coefficients of expansion for the benefit of performing an objective quantitative analysis of glandular tissue as taught by Kaufhold in the abstract.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-21 and 23-25 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Numbers 5,133,020; 5,452,367; 5,982,916; 6,282,307; and 6,434,261 disclose generating a histogram of an x-ray image, selecting a threshold from the histogram, and segmenting the x-ray image into regions using the threshold.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey S. Smith whose telephone number is 571 270-1235. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571 272-7429. The fax

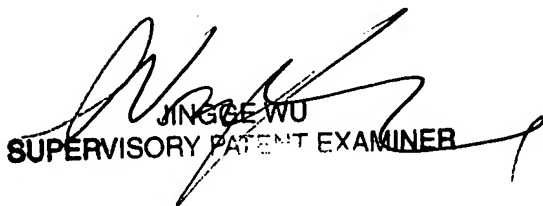
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phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JSS

September 5, 2007

  
JINGGE WU  
SUPERVISORY PATENT EXAMINER